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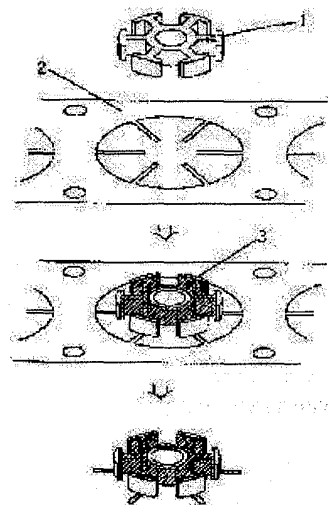
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## (54) BRUSHLESS MOTOR

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide a small-sized, high-output, and high-accuracy stator core by integrally forming the stator core by molding a core made of a magnetic material and a terminal block composed of a metallic sheet with an insulating resin while the terminal block is put on the lower section of the salient pole of the core.

**SOLUTION:** A stator core 1 is constituted by integrally molding the core 1 and a terminal block 2 made of a metallic sheet with an insulating resin 3 while the block 2 is put on the lower section of the salient pole of the core 1. Therefore, a small-sized core 1 and, as a result, a small-sized motor can be obtained, because it becomes unnecessary to provide a space for fitting terminal pins in the inner peripheral section of the core 1. In addition, the terminal section can be manufactured easily by a pressing technique, since the metallic sheet is used and, when the core and block 2 are integrally molded with the resin in addition to the use of the thin plate for the block 2, the core 1 with terminal can be manufactured easily and continuously.



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CLAIMS

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[Claim(s)]

[Claim 1] The brushless motor characterized by fabricating and constituting the terminal area of metal sheet metal from an insulating resin in piles at one in the outer-rotor type brushless motor which has a permanent magnet in a rotator with a core at a stator in the lower part of the core which consists a stator core of a magnetic material, and the aforementioned core salient pole.

[Claim 2] A terminal area is a brushless motor according to claim 1 characterized by carrying out insulating processing of the field of the side which touches a core.

[Claim 3] A terminal area is a brushless motor according to claim 1 characterized by making thinner than \*\*\*\* of the aforementioned core width of face of the fraction which touches a core.

[Claim 4] The brushless motor characterized by constituting with the insulator which fabricated to one the core which consists a stator core of a magnetic material, and the terminal of metal sheet metal by the insulating resin in the so-called outer-rotor type brushless motor which has a permanent magnet in a rotator with a core at a stator.

[Claim 5] A terminal area is a brushless motor according to claim 4 characterized by making thinner than \*\*\*\* of the aforementioned core width of face of the fraction which meets a core.

[Claim 6] The brushless motor characterized by having the terminal area fixed to the stator-core periphery lower part by one, and bearing fixed to the stator-core inner circumference section in the outer-rotor type brushless motor which has a permanent magnet in a rotator with a core at a stator, and fixing a stator core to the base by soldering of the aforementioned terminal area.

[Claim 7] Bearing is a brushless motor according to claim 6 characterized by carrying out pressing fixation at the resin section of stator-core inner circumference.

[Claim 8] The brushless motor according to claim 6 characterized by preparing the pin which penetrates the base in a stator core.

[Claim 9] A stator core is a brushless motor according to claim 6 characterized by preparing a part for bearing which penetrates the base.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] this invention relates to the small brushless motor used for an information device, or a picture, a sound device, etc.

[0002]

[Description of the Prior Art] A brushless motor is small in connection with a miniaturization of an information device, or a picture and a sound device, and price slashing, and a demand of the brushless motor of high power, high degree of accuracy, and a low cost is increasing in recent years.

[0003] The conventional brushless motor is explained below. Drawing 10 shows the structure of the conventional brushless motor. The stator core of the conventional brushless motor serves as the insulator 33 which consists of an insulating resin combined with the core 31 of a magnetic material, and the aforementioned core, and the configuration which becomes the aforementioned insulator from the metal terminal pin 32 by which pressing fixation was carried out. Moreover, bearing serves as the configuration which carries out pressing fixation of the bearing metal 34 at the metal metal housing 35, and carries out caulking fixation of the aforementioned metal housing at a base substrate.

[0004]

[Problem(s) to be Solved by the Invention] However, with the above-mentioned conventional configuration, the miniaturization of a device progressed, since the space for pressing a terminal pin fit in the inner circumference section of a core was needed when using a terminal pin in the first place today and in the first place as which highly-precise-izing and low-cost-ization has come to be required further like before, volumetric efficiency is bad and the miniaturization was difficult, and since it was necessary to press a terminal pin fit, it had the trouble where an automation was difficult. Moreover, when bearing is fixed to the second at the base through housing like before, in order to apply all precision, such as the precision of the periphery section to a bearing bore diameter, the pressing precision over housing, the precision of housing, and curvature of the base, maintaining the plumbness of bearing to the base, position precision, etc. had the trouble of being difficult.

[0005] that to which this invention solves the above-mentioned conventional trouble -- it is -- small -- high power -- highly precise -- in addition -- and it aims at offering the brushless motor suitable for mass production

[0006]

[Means for Solving the Problem] In order to attain this purpose, the brushless motor of this invention has the characteristic feature of having fabricated and constituted the terminal area of metal sheet metal from an insulating resin in piles at one in the core which consists a stator core of a magnetic material in the first place, and the lower part of the aforementioned core salient pole.

[0007] Or it has the characteristic feature that the insulator fabricated to one by the insulating resin constituted the stator core set to the second from a magnetic material in a stator core, and the terminal area of conductive sheet metal.

[0008] Furthermore, it has the terminal area fixed to the third by the stator-core periphery lower part at one, and bearing fixed to the stator-core inner circumference section, and has the characteristic feature of having fixed the stator core to the base by soldering of the aforementioned terminal area.

[0009]

[Function] A terminal area is continuously [ easily and ] producible with a press method of construction by constituting the terminal area of a stator core from metal sheet metal by the first configuration. Moreover, since it is being fixed to the core periphery section by one, a terminal area becomes unnecessary to prepare the space for attaching a terminal pin in the inner circumference section. Moreover, since the terminal area is constituted by a stator core and one, the process or parts for sufficient hold intensity being obtained and fixing a stator core become unnecessary [ the terminal area ] by soldering a terminal to a substrate.

[0010] Moreover, by the second configuration, by constituting the terminal area of a stator core from metal sheet metal, a terminal area can be easily produced by the press method of construction, and the insulator of a termination can really [ resin ] be produced easily and continuously by the combined use with molding.

[0011] Furthermore, by the third configuration, by carrying out a positioning of bearing and the base at the time of soldering of a terminal, solder absorbs the error of parts and the configuration of a highly precise motor of it is attained.

[0012]

[Example]

(Example 1) The 1st example of this invention is explained below, referring to a drawing.

[0013] Drawing 1 is drawing having shown the configuration of the stator core in the 1st example of this invention. The stator

core of this example fabricates and constitutes the terminal assembly 2 of metal sheet metal from an insulating resin 3 in piles in the salient pole lower part of a core 1 at one. By this configuration, since it becomes unnecessary to prepare the space for attaching a terminal pin in the inner circumference section, the core of a minor diameter can be used and a miniaturization of a motor is attained. Moreover, by using metallic nature sheet metal, a terminal area is easily producible by the press method of construction, is really [ resin ] the combined use with molding, and can produce the core with a terminal easily and continuously. Furthermore, since the terminal area is constituted by a stator core and one, the process or parts for sufficient hold intensity being obtained and fixing a stator core become unnecessary [ the terminal area ] by soldering a terminal to a substrate.

[0014] (Example 2) The 2nd example of this invention is explained below, referring to a drawing.

[0015] Drawing 2 is structural drawing of a terminal assembly in the 2nd example of this invention. The terminal assembly of this example is \*\*\*\*\*ing insulating processing to the field of the side which touches a core. insulating processing -- forge-fire \*\*\*\*\* -- by things, since a core and a terminal assembly can be stuck, the increase in the thickness by attaching a terminal assembly becomes possible [ it being stopped to the minimum extent and realizing a high power motor also by the same thickness ]

[0016] (Example 3) The 3rd example of this invention is explained below, referring to a drawing.

[0017] Drawing 3 is a cross section of a stator core in the 3rd example of this invention. The terminal assembly 2 of this example serves as the configuration which made thinner than \*\*\*\*\* of a core width of face of the fraction which touches a core 1. By this configuration, there is no fear of an insulation of a terminal assembly being broken by the burr of the edge fraction of a core. Moreover, since the length of a coil is simultaneously pressed down short per one turn when a coil is coiled, coil resistance becomes small and a high increase in power of it becomes possible.

[0018] (Example 4) The 4th example of this invention is explained below, referring to a drawing.

[0019] Drawing 4 is drawing having shown the configuration of the stator core in the 4th example of this invention. The stator core of this example constitutes with the core 11 which consists of a magnetic material, and the insulator 13 which fabricated the terminal assembly 12 of metal sheet metal to one by the resin made from an insulation. By this configuration, since it becomes unnecessary to prepare the space for attaching a terminal pin in the inner circumference section, the core of a minor diameter can be used and a miniaturization of a motor is attained. Moreover, by using metal sheet metal, a terminal assembly is easily producible by the press method of construction, is really [ resin ] the combined use with molding, and can produce the insulator with a terminal easily and continuously.

[0020] (Example 5) The 5th example of this invention is explained below, referring to a drawing.

[0021] Drawing 5 is a cross section of a stator core in the 5th example of this invention. The terminal assembly 12 of this example serves as the configuration which made thinner than \*\*\*\*\* of a core width of face of the fraction which meets a core 11. By this configuration, there is no fear of an insulation of a terminal assembly being broken by the burr of the edge fraction of a core. Moreover, since the length of the coil per one turn is simultaneously pressed down short when a coil is coiled, coil resistance becomes small and a high increase in power of it becomes possible.

[0022] (Example 6) The 6th example of this invention is explained below, referring to a drawing.

[0023] Drawing 6 is a cross section of the motor in the 6th example of this invention. A terminal assembly 22 is fixed to one by the resin 23 by the core 21, bearing metal 24 is being further fixed to inner circumference, and the motor of this example has become the configuration which fixed a core and bearing metal to the base substrate by soldering the aforementioned terminal assembly to the base substrate 25. By this configuration, since soldering of a terminal assembly serves as connection and fixation of a core and bearing metal, while a process becomes easy, by soldering, where the plumbness of bearing and position precision are taken out to a base substrate, all the parts precision and assembly precision which intervene between bearing and a base substrate can be absorbed with solder, and a highly precise axial precision is acquired. Moreover, since the terminal is attached in the core periphery section, the influence of unstable elements, such as deflation of the solder at the time of soldering, has the characteristic feature of being pressed down to the minimum extent.

[0024] (Example 7) The 7th example of this invention is explained below, referring to a drawing.

[0025] Drawing 7 is a cross section of the motor in the 7th example of this invention. The resin section 23 is fabricated by the core 21 of this example at one at inner circumference, and it has become the configuration which carried out direct pressing fixation of the bearing metal 24 at this resin section. Since bearing metal is pressed fit in a resin by this configuration, a resin absorbs deformation by pressing, and change of the bore of bearing metal is small and ends.

[0026] (Example 8) The example of the octavus of this invention is explained below, referring to a drawing.

[0027] Drawing 8 is a cross section of the motor in the example of the octavus of this invention. Pin 26a is formed in the core 21 of this example by one among the resin section 26 at the bottom, and this pin serves as the configuration which penetrated the base substrate 25. For such a reason, by this configuration, motion regulation of the longitudinal direction of a core can press down deformation of a terminal assembly when the lateral force is applied to Rota.

[0028] (Example 9) The 9th example of this invention is explained below, referring to a drawing.

[0029] Drawing 9 is a cross section of the motor in the 9th example of this invention. Housing section 27a is formed in the core 21 of this example by one among the resin section 27 at the bottom, and it has become the configuration in which this housing section penetrated the base substrate 25. By this configuration, since a bearing span can take for a long time, a life and the advantageous design in respect of axial rigidity are attained.

[0030]

[Effect of the Invention] as mentioned above, in the core which consists a stator core of a magnetic material, and the lower part of the aforementioned core salient pole, in piles, this invention fabricates the terminal area of metal sheet metal to one, and constitutes it from an insulating resin -- small -- high power -- in addition -- and the brushless motor suitable for mass production can be offered Moreover, it has the terminal area fixed to the stator-core periphery lower part by one, and bearing fixed to the

stator-core inner circumference section, and a highly precise axial precision is acquired by having fixed the stator core to the base by soldering of the aforementioned terminal area.

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**DESCRIPTION OF DRAWINGS**

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[Brief Description of the Drawings]

[Drawing 1] Drawing having shown the configuration of the stator core of the 1st example of this invention

[Drawing 2] The block diagram of the terminal assembly in the 2nd example of this invention

[Drawing 3] The cross section of the stator core of the 3rd example of this invention

[Drawing 4] Drawing having shown the configuration of the stator core of the 4th example of this invention

[Drawing 5] The cross section of the stator core of the 5th example of this invention

[Drawing 6] The cross section of the brushless motor of the 6th example of this invention

[Drawing 7] The cross section of the brushless motor of the 7th example of this invention

[Drawing 8] The cross section of the brushless motor of the example of the octavus of this invention

[Drawing 9] The cross section of the brushless motor of the 9th example of this invention

[Drawing 10] The cross section of the conventional brushless motor

[Description of Notations]

1, 11, 21, 31 Core

2, 12, 22 Terminal assembly

3, 23, 26, 27 Resin

4 Insulating Layer (Resin)

5 Adhesives

6 Steel Plate

13 Insulator

24, 34 Bearing metal

25, 36 Base substrate

26a Pin

27a Housing section

32 Terminal Pin

33 Resin Insulator

35 Metal Housing

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